

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
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in its capacity as elected Office

Date of mailing (day/month/year) 09 October 2000 (09.10.00)	
International application No. PCT/SE00/00035	Applicant's or agent's file reference ROS 005PCT
International filing date (day/month/year) 13 January 2000 (13.01.00)	Priority date (day/month/year) 18 January 1999 (18.01.99)
Applicant SKÖLD, Rolf	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 07 August 2000 (07.08.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. E. Stoffel Telephone No.: (41-22) 338.83.38
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PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : C10M 173/02	A1	(11) International Publication Number: WO 00/42135 (43) International Publication Date: 20 July 2000 (20.07.00)
(21) International Application Number: PCT/SE00/00035 (22) International Filing Date: 13 January 2000 (13.01.00) (30) Priority Data: 9900112-5 18 January 1999 (18.01.99) SE (71)(72) Applicant and Inventor: SKÖLD, Rolf [SE/SE]; Drag-onvägen 11, S-444 41 Stenungsund (SE). (74) Agent: ANDERSSON, Rolf; Onkel Sams Väg 6, S-444 42 Stenungsund (SE).		(81) Designated States: AU, BR, BY, CA, CN, CZ, EE, HU, ID, IL, IN, JP, KR, LT, LV, MX, NO, NZ, PL, RU, SI, TR, UA, US, ZA, Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: MECHANICAL WORKING IN THE PRESENCE OF A MULTI-PURPOSE COOLING LUBRICANT (57) Abstract The present invention relates to method for the mechanical working in the presence of a multi-purpose aqueous cooling lubricant being suitable for many different metals and alloys. The lubricant contains as its essential components a phosphate ester of the formula (I) $R_1(\text{oxyalkylene})_n\text{OP}(\text{O})(\text{X})(\text{OH})$, or (II): $(\text{HO})_2(\text{O})\text{P}-(\text{oxyalkylene})_m-\text{OP}(\text{O})(\text{OH})_2$, where R_1 is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms, n is a number from 1-20, X is hydroxyl, $R_1\text{O}$ or $R_1(\text{oxyalkylene})_n\text{O}$, where R_1 , oxyalkylene and n have the same meanings as above, and m is a number from 4-40, or a salt thereof, and a carboxylic acid of the formula (III) $\text{HOOC}(\text{R}_2)\text{CH}_2\text{COOH}$, where R_2 is an aliphatic group with 4-10 carbon atoms, or a salt thereof, or a mixture of any of the compounds (I), (II) and (III).		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
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MECHANICAL WORKING IN THE PRESENCE OF A MULTI-PURPOSE COOLING LUBRICANT

The present invention relates to a multi-purpose aqueous cooling lubricant suitable for the mechanical working of many different metals and alloys. The cooling lubricant containing as essential components a phosphate ester compound and a dicarboxylic acid contributes to excellent corrosion inhibiting and lubrication properties.

The mechanical working of metals is often performed in the presence of an aqueous cooling lubricant. A disadvantage of many aqueous cooling lubricants is that they frequently contain an iron corrosion inhibitor, such as monoethanolamine, diethanolamine or triethanolamine, which has a detrimental effect and causes discoloration and dissolution when used with cobalt, copper, aluminum, lead or zinc or alloys thereof. Besides the corrosion, any dissolved metal may also constitute a human health and environmental hazard and is difficult to remove from water in the process of disposal of the cooling lubricant.

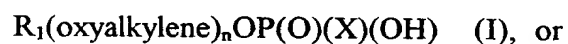
In order to mitigate the negative effects of alkanol amine, anionic surface active components with long aliphatic groups, such as groups with 14-44 carbon atoms have been added. Exemplary components are phosphate esters, fatty acids and dimer acids. Their protective action depends on the formation of water-insoluble, organic layers on the metal surfaces. If, however, dissolved di- or trivalent metals exist in the cooling lubricant, the anionic components will form water-insoluble salts with these metals ions. This may sometimes further increase the corrosion inhibiting effect, but it will also lead to the formation of undesirable a sticky precipitation, which e.g. tends to interfere with the purification of the cooling lubricant. Another drawback is the difficulty to remove the hydrophobic layers formed on the metal surfaces. If they are not removed, they could cause problems in the subsequent surface treatments, for example pickling, phosphatizing, galvanizing or other metal depositing processes. The presence of the long chain anionic components may also cause undesirable foaming and scum.

US patent 4 315 889 discloses a method of reducing the release of cobalt by performing the metal working in the presence of a cooling lubricant containing, as an active component, a specific triazole or thiadiazole compound. However, since these active compounds are consumed in the presence of ethanolamines, the aqueous cooling lubricant has to be regularly upgraded.

EP-A-0180561 describes the use of a tertiary alkanol amine compound for reducing the release of cobalt. According to the application the tertiary alkanol amine compound can advantageously be combined with carboxylic acids to further increase the protection against the release of cobalt and the corrosion of iron.

DE-OS-2 943 963 discloses the use of an alkanolamine salt of alkenyl succinic acid as corrosion inhibitor in aqueous solutions and US patent 4 670 168 describes a metalworking composition containing a water-soluble polyalkyleneglycol and a neutralised or partly neutralised alkenyl succinic acid.

According to the present invention it has now been found that the above mentioned problems may be reduced or eliminated by using a combination of a phosphate ester and a dicarboxylic acid as a lubricant and anti-corrosion agent in an aqueous metal working liquid, whereby the dissolution and discoloration of several metals, such as cobalt, copper, zinc, lead, aluminum and iron, and their alloys are effectively hampered. In more detail, the present invention relates to a process for the mechanical working of metals, which is performed in the presence of an aqueous cooling lubricant having a pH of 6-10 and containing a phosphate ester of the formula



where R_1 is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms, n is a number from 1-20, preferably 4-15, X is hydroxyl, the group $R_1\text{O}$ or the group $R_1(\text{oxyalkylene})_n\text{O}$, where R_1 , n and oxyalkylene have the above mentioned meanings, and m is a number from 4-40, preferably 5-20 or a salt thereof, and an alkenyl substituted succinic acid of the formula



where R_2 is an aliphatic group with 4-10 carbon atoms, or a salt thereof, or a mixture of the compounds I, II and III. The total amount of compounds I and II is from 0,2 to 5% by weight, preferably 0,4-3% by weight and the amount of compound III is from 0,2 to 5% by weight, preferably 0,4-3% by weight. The salts of the phosphate ester and the succinic acid are preferably formed of monovalent cations, such as potassium and sodium.

In the phosphate esters of formulae I and II, the $(\text{oxyalkylene})_n$ group and $(\text{oxyalkylene})_m$ group respectively, are suitably selected in such a way that the esters will be water-soluble or easily dispersible in water. Preferably the $(\text{oxyalkylene})_n$ group contains at least partially oxypropylene units and most preferably only oxypropylene units. The

aliphatic group R_1 can be saturated or unsaturated, straight or branched and contains preferably 2-8 carbon atoms. The group X is preferably a hydroxyl or the group $R_1(\text{oxyalkylene})_n\text{O}$. Preferably the phosphate ester of formula I consists of at least 50% by weight of monoesters. In formula II the polyoxyalkylene chain preferably consists at least partially of oxyalkylene groups with 3-4 carbons atoms and m preferably is at least 6, since these diphosphate esters beside the corrosion inhibiting effect give a considerable contribution to the lubrication. Especially suitable are those diphosphate esters, which contain a polyoxypropylene chain with 8-15 oxypropylene units.

The succinic acid of formula III contains an aliphatic group R_2 which can be a straight or branched alkenyl. Examples of alkenyl groups are octenyl, decenyl, di(isobutenyl) and tri(propenyl). Preferably the alkenyl group contains 7-9 carbon atoms. The succinic acids of formula III exhibit in addition to their excellent lubrication and anti-corrosion also low foaming, which is of essential importance in a metal working cooling lubricant.

The cooling lubricant can also contain a number of other additives, such as additional corrosion-inhibiting additives and lubricants, pH-regulating or controlling additives, bactericidal agents, viscosity-increasing additives, solubilizers, perfumes, colourants etc.

Examples of suitable additional corrosion inhibitors are amine compounds, such as triazole and thiadiazole compounds and inorganic compounds, such as alkali metal hydroxides and boric acid, and reaction products between boric acid and/or carboxylic acids and organic reactants, such as alkanol amines. The content of these additional corrosion inhibitors may be up to 3% by weight of the cooling lubricant.

Although the cooling lubricant containing the anionic surfactants I, II and III has an adequate lubrication ability for most applications it may be occasions where improved lubrication is desired. Examples of suitable lubricants to be incorporated into a cooling lubricant according to the invention are those selected from the group consisting of esters or amides of mono- or dicarboxylic acids having at least 12 carbon atoms in the acyl groups, organic aliphatic phosphate esters containing one or two aliphatic groups with 6-18 carbon atoms, nonionic alkylene oxide adducts with a molecular weight above 400, such as polypropylene glycols, glycols of randomly distributed propyleneoxy and ethyleneoxy groups and block polymers of propylene oxide and ethylene oxide, and mixtures thereof.

The content of these additional lubricants may be up to 3% by weight of the cooling lubricant ready for use.

The solubilizers are usually low molecular weight compounds containing at least one hydroxyl. The molecular weight is normally below 400. Examples of suitable solubilizers are propyleneglycol, methyl dipropyleneglykol, ethyl diethyleneglycol, butyl diethyleneglycol and butyl triethyleneglycol.

When preparing a cooling lubricant according to the invention, it is suitable to first prepare a concentrate, for example by first mixing the anionic compounds I, II and III and water, and then the supplementary ingredients. The amount of water is suitably between 5 and 80% by weight of the concentrate. A typical concentrate according to the invention has the following composition:

anionic compounds I, II and III	20-95, preferably 50-90% by weight
additional corrosion inhibitors	0-30, preferably 0-15% by weight
additional lubricants	0-30, preferably 0-15% by weight
water	5-80, preferably 10-50% by weight
other ingredients	0-30, preferably 0-15% by weight,

the weight ratio between the compounds I and/or II and compound III being from 1:15 to 15:1, preferably from 1:5 to 5:1.

The total amount of the additional corrosion inhibitors, the additional lubricants and the other ingredients is often 5-40% by weight of the concentrate. Before the concentrate is used, it is diluted with water so that the cooling lubricant ready for use will have a total content of the anionic compounds I, II and III of 0.5-10% by weight, preferably 2-6% by weight.

The present invention is further illustrated by the following Example.

Example

Three water-based lubricants A, B and C were prepared by adding 20 grams of octenyl succinic acid, 20 grams of n-butyl-(C₃H₆O)₁₀OPO₃H₂, or 10 grams of octenyl succinic acid and 10 grams of n-butyl-(C₃H₆O)₁₀OPO₃H₂, respectively, to 980 grams of water of a water hardness of 17°dH. The pH value of the cooling lubricants were adjusted to 9 by addition of KOH. The lubrication and corrosion-inhibiting ability of the cooling lubricants were tested. The lubrication was determined by measuring the wear scar obtained in modified Timken machine using steel rings A4138 with an outer diameter of 35

mm. The tests were performed during 2 and 5 minutes at a temperature of 45°C. The corrosion of Fe, Al, Co, Cu and brass was determined by the following test methods.

Fe-corrosion tests were done by placing 30 grams of cast iron chips evenly spread on a circular filter paper with a diameter of 90 mm. 1.25 gram of one of the cooling lubricants was dispensed at the centre of the filter paper, which was placed in a plastic Petri dish and covered by a lid. The corrosion taken place after 24 hours was determined by visually inspection of the rust staining according to a scale, where 0= no corrosion, 1= one stain, 2= two or three stains, 3= more than three stains up to 10% of the paper surface discoloured, 4= between 10 and 25% of the paper surface discoloured, and 5= more than 25% of the paper surface discoloured.

Co and Cu corrosion tests were performed by assessing the amount of leached cobalt and copper obtained, when a 20 ml glass vial containing 5 glass beads, 5 mg of fine powder of cobalt or copper and 10 ml of one of the fluids was shaken for 7 days. The amount of cobalt or copper dissolved was measured by use of an atomic absorption spectrophotometer (AAS). Initial screening of the fluids was done by using analytical sticks from Merck and only samples, which were found to contain less than 30 ppm of cobalt or copper were subjected to AAS analysis.

Since brass and aluminium are often used in applications where visual appearance is important an immersion test was performed to show the degree of discoloration caused by the test solutions. Strips of 5 mm width and 60 mm length of each metal were placed in separate glass vials and tests solutions were added in an amount sufficient to cover half the length of the upright standing strips. The corrosion was visually determined after 7 days. The discoloration of the strips was measured according to a scale from 0 to 5, where 0 represent no corrosion, 1 indicate that up to 5% of the surface is black, 2 that 5-10% of the surface is black, 3 that 10-25% of the surface is black, 4 that 25-90% of the surface is black, and 5 that 90-100% of the surface is black.

The following results were obtained.

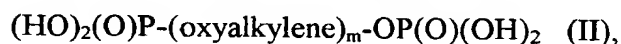
Table Corrosion and Timken Tests

Formulation	Corrosion					Timken, mm	
Symbol	Fe	Al	Brass	Co	Cu	2 min	5 min
A	0	0	0	0	5	0.97	1.07
B	4	0	1	0	10	0.83	1.17
C	0	0	0	0	5	0.83	1.03

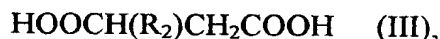
From the results it is evident that the cooling lubricant C of the invention has excellent anti-corrosion properties and is superior to the comparison compositions as regards the lubrication ability.

Claims

1. A method for the mechanical working of metals and alloys, characterised in that the method is performed in the presence of an aqueous cooling lubricant having a pH of 6-10 and containing a phosphate ester of the formula



where R_1 is an alkyl group with 1-12 carbon atoms, oxyalkylene is a group containing 2-4 carbon atoms, n is a number from 1-20, X is hydroxyl, $R_1\text{O}$ or $R_1(\text{oxyalkylene})_n\text{O}$, where R_1 , oxyalkylene and n have the meanings mentioned above, and m is a number from 4-40, or a salt thereof, and a carboxylic acid of the formula



where R_2 is an aliphatic group with 4-10 carbon atoms, or a salt thereof, or a mixture of any of the compounds I, II and III.

2. Method according to claim 2, characterised in that R_1 contains 2-8 carbon atoms and the group $(\text{oxyalkylene})_n$ contains at least partially oxypropylene units and n is a number from 4-15.

3. Method according to claim 2, characterised in that the phosphate ester of formula I is n -butyl- $(\text{C}_3\text{H}_6\text{O})_{10}\text{OPO}_3\text{H}_2$.

4. Method according to any of the claims 1-3, characterised in that the phosphate ester of formula II is $(\text{HO})_2(\text{O})\text{P}-(\text{oxypropylene})_{8-15}\text{OP(O)(OH)}_2$.

5. Method according to any one of claims 1-4, characterised in that R_2 in formula III is octenyl, decenyl, diisobutenyl or tripropenyl.

6. Method according to any one of claims 1-5, characterised in that the total amount of compounds I and II is from 0,2 to 5% by weight and the amount of compound III is from 0,2 to 5% by weight.

7. Method according to claim 6, characterised in that the total amount of compounds I and II is from 0,4 to 3% by weight and the amount of compound III is from 0,4 to 3 % by weight.

8. A concentrate, characterised in that it contains

anionic compounds I, II and III according to claims 1-5	20-95% by weight
additional corrosion inhibitors	0-30% by weight

additional lubricants 0-30% by weight

water 5-80% by weight

other ingredients 0-30% by weight,

the weight ratio between the compounds I and/or II and compound III being from 1:15 to 15:1

9. Concentrate according to claim 8, characterised in that it contains

the anionic compounds I, II and III 50-90% by weight

the additional corrosion inhibitors 0-15% by weight

the additional lubricants 0-15% by weight

water 10-50% by weight

the other ingredients 0-15% by weight,

the weight ratio between the compounds I and/or II and compound III being from 1:5 to 5:1.

10. Concentrate according to claim 8 or claim 9, characterised in that the total amount of the additional corrosion inhibitors, the additional lubricants and the other ingredients is from 5 to 40% by weight.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/00035

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: C10M 173/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: C10M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0120822 A1 (BEROL KEMI AB), 3 October 1984 (03.10.84), page 3, the last paragraph and page 4, the first paragraph --	1-10
A	US 4670168 A (JOSEPH T. LAEMMLE ET AL), 2 June 1987 (02.06.87) --	1-10
A	DE 2943963 A1 (BASF AG), 14 May 1981 (14.05.81) -- -----	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 May 2000

Date of mailing of the international search report

15-05-2000

Name and mailing address of the ISA/

Swedish Patent Office

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE 00/00035

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
EP	0120822	A1	03/10/84	SE	0120822 T3	
				AT	27297 T	15/06/87
				BR	8400398 A	18/09/84
				CA	1208195 A	22/07/86
				DK	57084 A	11/08/84
				ES	529573 A	16/03/85
				FI	840167 A	11/08/84
				JP	59147093 A	23/08/84
				NO	840493 A	13/08/84
				SE	441099 B,C	09/09/85
				SE	8300704 A	11/08/84
				US	4564461 A	14/01/86

US	4670168	A	02/06/87	NONE		

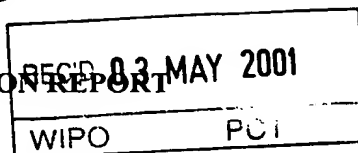
DE	2943963	A1	14/05/81	NONE		

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference ROS 005PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE 00/00035	International filing date (<i>day/month/year</i>) 13.01.2000	Priority date (<i>day/month/year</i>) 18.01.1999
International Patent Classification (IPC) or national classification and IPC7 C 10 M 173/02		
Applicant Sköld, Rolf		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of _____ sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand 07.08.2000	Date of completion of this report 24.04.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Dagmar Järvman/EÖ Telephone No. 08-782 25 00

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	<u>1-10</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-10</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention relates to a method and a concentrate for mechanical working of metals and alloys, in the presence of an aqueous cooling lubricant having a pH of 6-10. The lubricant contains a phosphate ester and a carboxylic acid with the formulas as defined in claim 1.

In the following statement, the wording "a mixture of any of the compounds I, II and III" in claim 1 has been interpreted as "a mixture of the compounds I, II and III", i.e. as if component III has to be present in the mixture.

EP 0120822 A1, discloses a method and a concentrate for mechanical working of metal in the presence of an aqueous lubricant containing a corrosion inhibitor. As corrosion inhibitor is mentioned, among others, a phosphate ester as mentioned in claim 1 and carboxylic acids (see page 3, the last paragraph and page 4, the first paragraph). A metal working fluid containing both a phosphate ester and a carboxylic acid with the formulas as defined in the present claim 1 is not disclosed in this document.

US 4670168 A, describes an aqueous metalworking composition comprising a dicarboxylic acid (alkyl or alkenyl succinic acid).

DE 2943963 A1, describes the use of salts of alkenyl succinic acids as corrosion inhibitor in aqueous systems.

None of these two documents mention the combination of alkenyl succinic acid with an alkyl ether phosphate ester as defined in the claims.

.../...

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Thus, none of the documents disclose the currently claimed method and a concentrate for mechanical working of metals and alloys. The cited documents only disclose the general state of the art, which is not considered to be of particular relevance. The applicant has shown that the claimed cooling lubricant has improved corrosion inhibiting properties and improved lubricating properties. Therefore, the claimed invention is considered to fulfil the requirements of novelty, inventive step and industrial applicability.